Monthly Program Progress Report

For the period from 1 June 1997 through 31 July 1997

Project: SH-60R Operator Machine Interface Enhancement (SHOMIE)

CHI Systems Project 9704
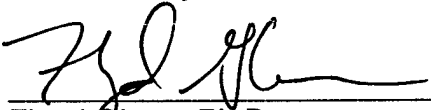
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1. Project Abstract

A systematic approach, designated SH-60R Operator-Machine Interface Enhancement (SHOMIE), is proposed for developing decision aid enhancements to the SENSO and ATO crewstations of the SH-60R aircraft which is currently under development by the Navy. The methodology begins with determination of functional performance requirements via a technique based primarily, but not exclusively, on cognitive task analysis. Cognitive performance limitations are determined both analytically and empirically and then used to derive functional requirements for decision aid concepts to overcome the identified limitations. Relevant software and algorithmic techniques for realizing the desired functionality are then derived from an evaluation of viable candidates obtained from a taxonomic analysis of aiding technologies. Finally, the decision aid concepts are specified as structured architectural designs which are then implemented as software prototypes.

The Phase I effort will focus primarily on the SENSO crewstation because the SENSO's tasks are expected to be changed more radically than the ATO's with the introduction of new sensor information processing software. Also to restrict the scope of the effort to a manageable level and still assure operational relevance, we propose to focus on the domain of acoustic search and localization in littoral ASW missions. CHI Systems has worked extensively in this domain, having developed a variety of ASW decision aids, training tools, cognitive task analyses, and testbeds, all of which will greatly facilitate the development of the decision aids to be formulated by the SHOMIE methodology.

2. Project Status Summary

The necessary background documents and technical contacts for this project were obtained in May and progress has been good since that time. Based on communications and document reviews, a concept for a COGNET-based adaptive aid for the SENSO is being developed. A meeting is planned with the project oversight committee at Patuxent River on 28 August 1997 to present and discuss this developing concept.

3. Progress During the Current Reporting Period

Work during this period consisted primarily of contacting and meeting relevant subject matter experts, refining our understanding of Government requirements for this project, and formulating a system solution concept.

Telephone conversations were held with Ms. Becky Morgan, LT Fred Latrash (VX-1), Mr. Jim Tober (NAWCAD), Mr. John Suarez (A&T), and Mr. Roy Wagner (Lockheed-Martin). Meetings were subsequently held with Mr. Jim Tober and Ms. Nancy Dolan (both NAWCAD, on 16 July 1997) and with LT Fred Latrash

and about a dozen other VX-1 representatives (28 July 1997). The meeting with VX-1 was particularly productive in identifying and prioritizing specific SENSO problems and concerns for acoustic processing functions and decisions in the SH-60R context. The VX-1 representatives, who included both SENSO and ATO perspectives, volunteered to produce a summary write-up of the results of the meeting.

Through our meetings, conversations, and document reviews, it has become apparent that the Decision Support System (DSS), particularly the acoustic components known as the ATAP, are not yet well-defined even to the level of functional requirements. Since it has been intended that this project would develop an adaptive aid that would facilitate the use of the other ATAP components, this appears to require that this aid will have to be quite flexible in order to connect effectively with many currently unspecified components. It also appears from our meeting with VX-1 that many high priority functions for the current SENSOs are not even on the ATAP list.

Based on our current understanding of project requirements, it appears that an adaptive aiding concept which CHI Systems has previously developed and demonstrated for the case of a P-3C TACCO would apply well for this project. In the earlier project, we developed a cognitive model of TACCO decision processes in an acoustic search mission. We then embedded that model in a simulated TACCO crewstation and used that model to anticipate key functions that the TACCO would want to perform. The system would aid the TACCO by offering reminders to the TACCO of key functions as they became tactically appropriate and also by enabling the TACCO to invoke automated agents which were provided to accomplish many of these key functions. We believe that a similar aiding system could be developed for the SH-60R SENSO to aid in accessing and performing complex functions with the crewstation interface and DSS functions in particular.

4. Problems

No new problems have arisen in this reporting period and prior problems have been resolved.

5. Plans for the Next Reporting Period

We will meet with the Navy project oversight committee in late August and review progress and plans for the project. We will begin to develop detailed plans for Phase II implementation of the COGNET-based adaptive aid described above in Sec. 2, based on feedback obtained from the review meeting. We will also develop a plan for demonstrating the planned Phase II product, prior to the completion of the Phase I effort, through a limited adaptation of the existing adaptive TACCO aid.

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6.   Task and Budget Status

As of 31 July 1997, 33.8% of the Phase I base period budget ($70,000) had been expended, with that effort completing the planned work on Task 1 (cognitive model development) and Task 2 (identification of decision making limitations).